

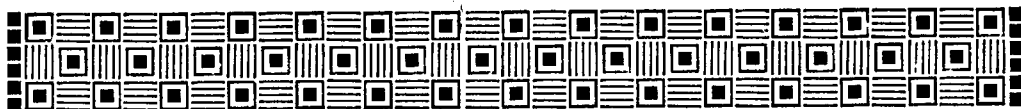
Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5



NOTE ON THE STANDARDISATION OF RADIO TIME SIGNALS.

based upon a treatise submitted by Mr. G. BIGOURDAN
to the ACADÉMIE DES SCIENCES, Paris. (Proceedings of 3rd September 1928).

Originally the daily so-called "ordinary" time signals were used principally for navigation and, for this purpose, an accuracy of within half a second only was expected of them. They could be made by hand but, later, with a view to obtaining greater accuracy, the ordinary signals were worked automatically, thus ensuring a precision of half a tenth of a second. This led to providing more accurate signals for longitudes, which signals consisted of rhythmic emissions and which permitted observation, by the method of coincidences, to within 1/100 second.

THE INTERNATIONAL (ONOGO) SYSTEM (fig. 1)

This system was adopted at the Conférence Internationale de l'Heure, 1912-1913, as the International System for ordinary automatic wireless time signals. It is known also as the "ONOGO" system, the name being derived from the sequence of Morse letters used in the time code. The transmission lasts 3 minutes; each dash is of one second's duration and each dot 0.25 second. The particular signal of this series which is accepted as the time signal varies in different countries; in some cases the end of the final dash in the letter "O" (— — —), representing an even minute, is taken; while other countries use the dots of the letters "N" (— .) and "G" (— — .).

This type of signals is used by the following countries:-

Germany; India; Ceylon; Java; Western Australia and South Australia.

NEW INTERNATIONAL SYSTEM (fig. 2)

In July 1923, the International Time Committee recommended that the present International (ONOGO) System of Signals should be amended by the substitution of six dots (.) sent at the 55th, 56th, 57th, 58th, 59th and 60th seconds of each minute instead of the three dashes constituting the letter "O". These dots constitute the time signal.

This new system of international signals has now been adopted in France, Russia, Portuguese East Africa, Victoria, Argentine, and Brazil.

AMERICAN SIGNALS (fig. 3)

The United States use a distinct type of signals.

The signal consists of the transmission of a series of dots over a period of 5 minutes. A dot is emitted at every second, omitting the 29th, 55th, 56th, 57th, 58th, and 59th seconds of the first four minutes; in the 5th minute the procedure is the same, except that the dot is omitted at the 29th, 50th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th and 59th seconds; at the 60th second a one-second dash (—) is made, the beginning of which is the time signal.

A similar system, except that the final dash of the last minute is replaced by a dot (.), has been adopted in Chile.

NEW INTERNATIONAL SYSTEM OF RHYTHMIC TIME SIGNALS (fig. 4)

As a result of the deliberations of the International Time Committee in 1925, the system of rhythmic sidereal time signals, hitherto transmitted by French stations, has been abandoned in favour of the New International System of Rhythmic Signals, which comprises a series of 306 signals transmitted in 300 seconds of Mean Time. At the commencement of each of the five minutes a dash (—) of half-a-second's duration is transmitted; this dash is followed by a series of 60 dots (..... *etc.*), the final signal at the sixth minute being signalled by a dash. The signals 1, 62, 123, 184, 245 and 306 which coincide respectively with the beginning of a minute consist of dashes.

The following stations have adopted the new system :-

RUGBY, PARIS - EIFFEL TOWER, BORDEAUX - LA FAYETTE, MOSCOW, LENINGRAD and SAIGON.

The German station of NAUEN transmits slightly different signals. Standard Mean Time is used for these signals so that, provided that good comparisons are obtained, the rating of the chronometer is direct. Each series is composed of 301 signals; the signals 0, 60, 120, 180, 240 and 300 are sent as dashes of a duration of half-a-second; all the other signals are dots. The interval between any two signals is approximately 0.977 sec.

OTHER SYSTEMS:

A certain number of other systems, which cannot be classed in the above categories, are used by different countries. The total number of varieties of signals for the whole world to-day reaches the number of about 40 signals of varying accuracy, employed by various categories of users of such signals.

It would be of obvious advantage for all, and in particular for the requirements of navigation, to have, throughout the world, but one standard type of signals; nevertheless in 1925 the automatic signals were retained because in them the various minutes are more sharply marked than in the present-day rhythmic signals. Consequently, if the various minutes could be as easily distinguished in the rhythmic signals as in the automatic, there would no longer be any need to retain the latter. Now, this is possible by means of a new system recommended by M. BIGOURDAN and shown diagrammatically in Figure 5.

Figure 4 represents the rhythmic signals of to-day.

In these two figures, the signals are distributed over 5 parallel lines.

The first minute is sometimes preceded by preliminary or warning signals, for which no rule has been laid down (*) The graduation represents the dial divided into 60 seconds.

Comparison of Figures 4 and 5 immediately shows the modification proposed in order to indicate the various minutes :-

First minute : always recognisable by the preliminary signals ;

Second minute : is preceded by two indicating dots announced by a dash ;

Third minute : is preceded by three indicating dots also announced by a dash, *etc.*

Comparison with the automatic signals shows that the minutes of the new system will be at least as clearly indicated as those of the present automatic system; for this reason the new system (Fig. 5) attracted the attention of the International Time Committee at its recent meetings at Leyden (July 1928). It must be mentioned, however, that, without affecting its fundamental principle, various modifications have been contemplated. Thus, it has been requested :-

1. That it be not possible to confuse the *dashes* sent out to announce the indicating dots of the next minute with the dash which, in this system, begins each minute. It is easy, for example, to make the new dashes of 2^s or 3^s duration; but the chances of losing coincidences will be increased.

2. That the dashes shall follow the beginning of the minute instead of preceding it.

3. That the indicating *dots* of the next minute may be repeated. This is equally easy, but is open to the same objection as above.

(*) *Certain observers have asked for the elimination of preliminary signals with a view to saving time, but these are indispensable when the same instruments must serve several very different wave-lengths in succession.*

4. That instead of *dashes* to announce the dots indicating a minute, a more or less long silence be employed; but it must be recalled that, in 1922, such intervals of silence were replaced by dots at the request of observers at great distances. (*See Bulletin horaire*, vol. 1, page 375).

It is the Time Committee which must reconcile these various desiderata as well as possible and make a definite decision.

It will be necessary also to consider the putting into practice of the system here recommended — which will require some little time; but, even now, it may be said that the requisite emitter will be less costly than the instruments constructed at present for automatic signals.

The new system (Fig. 5) would thus possess a double advantage; it would be more economical and it would contribute to the multiplication of signals, the advantages of which are generally recognised and, moreover, are evident.

When the system has been put into practice, the list of emissions of signals could be revised, for it would doubtless be sufficient that, in all parts of the world, whether continental or oceanic, signals should be made at every even hour, thus another appreciable economy would be effected.

